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Measurements.

	m. c.....	32 mm.
	first phalanx.....	15 "
3d digit...	second "	15 "
	third "	9 "
	fourth "	4 "
	m. c.....	31 "
4th digit..	first phalanx.....	14 "
	second "	11 "
	third "	$\frac{1}{2}$ "
	m. c.....	33 "
5th digit..	first phalanx.....	14 "
	second "	10 "
	third "	1 "
	m. c.....	15 "
Length of femur.....		15 "
" tibia.....		16 "
" foot.....		13 "
" tail.		25 "
" free portion of tail.....		$3\frac{1}{2}$ "

Notices of New Fresh-water Infusoria.

By Alfred C. Stokes, M.D.

(Read before the American Philosophical Society, April 18, 1890.)

Mastigamæba reptans, sp. nov. Figs. 1-5.—Body constantly amœboid, at its apparently greatest extension ovate, depressed, about two and one-half times as long as broad, the pseudopodia few, scattered, lobate, short and unbranched, progression being chiefly by the amœboid expansions of the body; flagellum apical, about three times as long as the extended zooid, only the tip usually vibrating; nucleus not observed; contractile vesicles several, small, scattered; motion commonly very slow, occasionally rapidly and irregularly vibratory. Length of the extended body $\frac{1}{1800}$ inch. Hab.—Pond water with decaying vegetation.

Heteromita fusiformis, sp. nov. Figs. 6 and 7.—Body elongate fusiform, from three to four times as long as broad, widest centrally, tapering thence to both extremities; soft and changeable in shape, having the ability to protrude filamentous pseudopodic prolongations of the body substance, the extremities of these extensions not rarely becoming amœboid and producing a reticulation by the interlacing of the minute branches or by the formation of minute vacuoles; flagella diverse in length, originating close together at the frontal extremity, the anterior one vibratile, less than twice as long as the body, the other trailing and more than twice the body in length; contractile vesicle small, apparently

single, situated in the posterior body-half; endoplasm finely granular. Length of body $\frac{1}{1500}$ inch. Hab.—Standing pond water. Movements rapidly vibratory.

Heteromita triangularis, sp. nov. Fig. 8.—Body ovate or subtriangular, depressed, smooth, twice as long as broad, the anterior border obliquely truncate, sometimes slightly concave, the shorter lateral border often flattened; the longer convex; posterior extremity obtusely pointed; anterior flagellum about one-half as long as the body, the posterior or trailing appendage from two to three times the length of the zooid; contractile vesicle single, posteriorly situated near the longer lateral border; nucleus apparently represented by a small light spot near the centre of the anterior body-half. Length of body from $\frac{1}{4500}$ to $\frac{1}{3000}$ inch. Hab.—Standing pond water.

Food seems to be engulfed chiefly near the anterior extremity, this region surrounding the particle by an irregular outflow of endoplasm, the zooid then becoming indescribably unsymmetrical in form. The anal aperture is postero-terminal or nearly so.

Macromastix ($\mu\alpha\rho\kappa\omicron\varsigma$, long; $\mu\alpha\sigma\tau\iota\zeta$, lash), gen. nov.—Animalcules free swimming, ovate, having three flagella arising near together, one short, antero-terminal and vibratile, two opposite, lateral and trailing; food engulfed at any point on the surface. Inhabiting standing water.

Macromastix lapsa, sp. nov. Figs. 9 and 10.—Body ovate, about twice as long as broad, the anterior region changeable in shape, that margin rounded and often obliquely truncate, the posterior obtusely pointed; anterior flagellum short, arising from the centre of the anterior truncation, the lateral appendages trailing, about three times as long as the body; endoplasm colorless, transparent; contractile vesicle single, laterally placed near the body centre; nucleus not observed. Length $\frac{1}{4500}$ inch. Hab.—Standing pond water.

This form is a member of the Trimastigidae of Saville Kent, and resembles most nearly the *Dallingeria* of the same authority, differing chiefly in the diverse length of the flagella, these appendages in *Dallingeria* being subequal. The lateral flagella of *Macromastix* arise from opposite points nearer the frontal border than do the similar appendages of *Dallingeria*, in the last named form arising from the lateral borders at some distance from the frontal margin; and possessing adhesive power in the distal extremities, nothing of the kind having been observed with the present form. Food is engulfed at any point of the surface.

Trachelomonas cervicula, sp. nov. Fig. 11.—Lorica subspherical, smooth, orange yellow in color; anterior orifice with a thickened, slightly projecting external border, and produced internally as a straight, cylindrical, chitinous tube about one-third as long as the diameter of the lorica, its anterior border attached around the anterior orifice of the sheath, its posterior or internal margin circular and free, the long flagellum of the enclosed animalcule protruded through this internal, tubular passage, and the body, when completely filling the lorica, surrounding the cylinder as if pierced by it. Diameter of the lorica $\frac{1}{1125}$ inch. Hab.—Pond water.

The species differs from all other known forms by the presence of the internal tubular prolongation. It was collected in some abundance from a sheltered pond in the early part of February, 1890. It is, therefore, probably a vernal Infusorian.

Trachelomonas similis, sp. nov. Fig. 12.—Lorica oval or subelliptical, nearly twice as long as broad, the extremities subequally rounded, the surface irregularly and finely punctate, the aperture produced as an obliquely directed neck-like prolongation, the margin oblique and irregularly denticulate; color chestnut brown. Length of lorica $\frac{1}{800}$ inch. Hab.—Standing pond water, with aquatic plants.

This approaches most nearly the *T. lagenella* (Ehr.) Stein, which is described as colorless and entirely smooth, neither of which conditions are observable in the present form.

Trachelomonas obovata, sp. nov. Fig. 13.—Lorica obovate, less than twice as long as broad, the anterior border convexly truncate, the posterior obtusely pointed; surface minutely hispid, aperture slightly projecting, its margin rather more coarsely hispid; color deep chestnut brown; flagella twice or more as long as the lorica. Length of lorica $\frac{1}{1125}$ inch. Hab.—Standing water from the pools of early spring.

Trachelomonas spinosa, sp. nov. Fig. 14.—Lorica oval, about one and one-third times as long as broad, both extremities equally and evenly rounded, the entire surface clothed with slightly recurved spines, which are largest at the posterior border; the anterior aperture produced as a short, smooth, truncate extension; color brown. Length, exclusive of the spinous processes, $\frac{1}{800}$ inch. Hab.—Pond water, with aquatic plants.

Epipyxis socialis, sp. nov. Fig. 15.—Lorica elongate subcylindrical, from eight to ten times as long as broad, often variously curved and bent, the lateral borders nearly parallel, tapering posteriorly to the subacute point of attachment, the anterior border truncate, usually not everted, sometimes slightly flaring. Length of lorica $\frac{1}{800}$ to $\frac{1}{550}$ inch. Hab.—Pond water in early spring; attached to Confervæ. Social, occasionally forming radiating, rosette-like clusters composed of fifty or more thecæ, or in irregular fascicles produced by the attachment of from eight to ten lorice to a single supporting theca.

The colonies formed by the attachment of one or more lorice to a single theca as a basis of support, would seem to foreshadow the polythecium or compound branching colony of *Dinobryon*, to which *Epipyxis* is closely allied. Groups not rarely occur formed of from eight to ten thecæ basally attached to one and the same supporting lorica.

Epipyxis eurystoma, sp. nov. Fig. 16.—Lorica elongate-vasiform, about three times as long as broad, widest at the anterior aperture, that orifice flaring, constricted near the anterior border, widening subcentrally and thence tapering to the subacute posterior point of attachment. Length of lorica from $\frac{1}{800}$ to $\frac{1}{1000}$ inch. Pond water, attached to various aquatic plants.

Cryptoglana alata, sp. nov. Fig. 17.—Lorica obovate, colorless, less than twice as long as broad, the anterior region widest, the frontal border

obliquely truncate; the lateral margins thinned and projecting beyond the borders of the enclosed animalcule in a wing-like manner, the borders somewhat curved in opposite directions as seen when the Infusorian is examined "end on," or with the anterior or posterior region presenting upward; posterior border narrowed, obtusely rounded; the dorsal and ventral aspects apparently encircled by a shallow transverse groove or depression, at times two; anterior orifice circular, its walls comparatively thick, the two vibratile flagella passing out close to the lateral margins; enclosed body elongate ovate, granular. Length of lorica $\frac{1}{1000}$ inch; greatest width $\frac{1}{1500}$ inch. Hab.—Pond water in early spring.

Furcilla, gen. nov.—Animalcules persistent in shape, free-swimming, the anterior border rounded or minutely and centrally pointed, the posterior extremity bifid, the bifurcation remote or approximate; flagella two, subequal, arising close together from the anterior apex.

The position of this newly instituted genus in a scheme of classification would probably be in the Heteromonadidæ of Bütschli, Goniomonas of Stein and the Amphimonas of Dujardin, having its affinities closer to those of the former than of the latter. Although the single known species of the genus was exceedingly abundant in the infusion, I have not seen the oral aperture in any, neither have I seen any in the act of taking food, nor observed any whose endoplasm contained colored granules or other presumable food particles. I therefore assume, on these negative grounds alone, that the genus should be classed among the Flagellata-Pantostomata of Saville Kent.

Furcilla lobosa, sp. nov. Figs. 18-21.—Body more or less ovate, less than twice as long as broad, or in dorsal and ventral view somewhat horse-shoe-shaped, the posterior region bifid, the bifurcation forming about one-half the entire length of the body, straight, somewhat divergent or slightly and inwardly curved, tapering and their extremities obtusely rounded; anterior border convex, with a slight central acumination from which arises the two subequal, vibratile flagella; the lateral borders bearing two rounded lobules or conspicuous protuberances, one on each side, oppositely placed and alternating with the elongated furcated region, the body in transverse optic section presenting an unequally quadrilobed outline, but in lateral view more or less ovate with two opposite, lateral, obtusely rounded wing-like projections or protuberances; flagella exceeding the body in length; contractile vesicle double, near the centre of the frontal border; nucleus single, located anteriorly near one lateral margin; endoplasm granular. Length $\frac{1}{250}$ to $\frac{1}{180}$ inch. Hab. A vegetable infusion of decaying Algæ and aquatic plants. Movements rotatory and tremulous.

The body, as far as the prolongation and two lateral protuberances are concerned, is somewhat variable. The latter are, at times, so obscurely developed and are apparently so nearly merged into the anterior body-half that the region becomes subglobose. The posterior prolongations vary in curvature, in their distance apart, and somewhat in their extremities, being at times rounded, at others subacute. The varying direction of

the furcation is such that they may slightly diverge, or be so closely approximated that their inner borders are almost in contact and broadly obovate in outline.

Lagenophrys bipartita, sp. nov. Fig. 23.—Lorica subhemispherical, depressed; dorsal surface rounded, ventral flattened, and surrounded horizontally by a depression that gives the adherent margin a projecting aspect as if bordered by a narrow rim, an internal membrane extending as a floor across the lorica at the position of the encircling constriction and dividing it into two unequal parts; posterior border irregularly crenate, the surface obliquely striate or ridged; the anterior valvular aperture small, the valves acuminate. Diameter of the lorica $\frac{1}{260}$ inch. Hab.—Ectoparasitic on *Daphnia*.

This was taken abundantly adherent on the entomostrakon mentioned, being observed in a gathering made on January 19, 1890. The winter had been an exceptionally mild one, and this collection resembled collections made in the early spring in the abundance, variety and activity of their microscopic life. Even the entomostraca were burdened by their usual load of infusorial parasites.

This is the only member of the genus in which a dividing membrane has been observed above the region adherent to the supporting object, and acting as a floor on which rests the soft body of the enclosed animalcule. This floor-like structure exists, and is readily demonstrated if the lorica can be detached uninjured from the host, as the writer has several times had the opportunity to do. The enclosed zooid seems to rest on this floor-like partition, being of course adherent at the anterior valvular orifice, as is commonly the structural arrangement with all the observed species. The projecting basal rim has a tendency to become brown, as is so frequently observed in many infusorial loricae, and its surface is irregularly crenulate. With advanced age it probably changes color entirely.

Podophrya pusilla, sp. nov. Fig. 23.—Body subspherical, pedicle comparatively stout, its length equaling about one-half the diameter of the body; tentacles from twelve to fourteen, irregularly distributed, distinctly capitate, often twice as long as the diameter of the body; contractile vesicle apparently single, situated near the centre of the frontal border; nucleus obscure, apparently subspherical; endoplasm usually finely granular. Diameter of the body $\frac{1}{930}$ inch. Hab.—Pond water, attached to various aquatic weeds.

Solenophrya oblonga, sp. nov. Fig. 24.—Lorica oblong, very much compressed, less than three times as long as broad, often tapering posteriorly, the lateral borders nearly straight, the posterior margin rounded or somewhat flattened, seemingly by the pressure of the supporting object; anterior margins somewhat convex, not continuous but separated by a narrow interval, the lateral borders enlarged and rounded; tentacles in two antero-lateral fascicles, capitate; contractile vesicle single, small, located near the anterior border; nucleus ovate, slightly curved, placed subcentrally near one lateral border; endoplasm granular, almost entirely

filling the cavity of the lorica. Length $\frac{1}{4}\frac{1}{10}$ inch. Hab.—Standing pond water, attached to the rootlets of aquatic plants.

Solenophrya alata, sp. nov. Fig 25.—Lorica, when viewed laterally, irregularly ovate, depressed, longitudinally traversed by five broad, thin, equidistant, perpendicular and anteriorly converging alæ, their free margins irregularly undulate, and their height varying, usually being greatest near their centre; posterior border evenly convex, the anterior narrowly concave and alate. Lorica when viewed from above pentagonal, a longitudinally disposed ala originating from each angle, converging anteriorly and meeting at the summit of the sheath which is apparently continuous across the frontal region; enclosed animalcule almost entirely filling the cavity of the lorica, the tentacles capitate, protruding through the alæ; endoplasm granular; nucleus obscure, apparently ovate and subcentrally located; contractile vesicle single, posteriorly placed near one border. Diameter of the lorica $\frac{1}{5}\frac{1}{10}$ inch, height $\frac{1}{8}\frac{1}{10}$ inch; length of each of the five sides $\frac{1}{8}\frac{1}{8}$ inch. Hab.—Attached to the rootlets of *Lemna*.

Apgaria purpurascens, sp. nov.—Body elongate ovate, longitudinally furrowed, anteriorly flattened, in general outline and aspect resembling *A. elongata*; endoplasm deep reddish purple in color; nucleus double, ovate, the nodules situated in the posterior and the anterior body-halves respectively, and connected by a funiculus; contractile vesicle double, located near the posterior extremity. Length of mature forms $\frac{1}{8}\frac{1}{10}$ inch, the length being from three to four times the width. Hab.—Pond water, and on the lower surface of water-lily leaves, near Minneapolis, Minn.

This beautiful and interesting form was originally discovered by Dr. P. L. Hatch, of Minneapolis, where it was abundant, and specimens were kindly sent to me. From *A. elongata*, which it resembles in general contour, it differs widely in three important particulars: the remarkable deep purplish-pink color of the parenchyma, in the double nucleus with a funiculus connecting the nodules, and in the great size. *A. elongata*, the most nearly related species, is colorless, it has but a single nucleus, and is in size only about $\frac{1}{8}\frac{1}{10}$ inch in length. Reproduction with the form here referred to as *Apgaria purpurascens* takes place by transverse, often somewhat oblique, fission.

Homalozoon (ὁμαλος, flat; ξων, body), gen. nov.—Animalcules free-swimming, hypotrichous, soft, flexible and elastic; elongate, much depressed, the anterior border obliquely rounded, thickened and abundantly supplied with trichocysts; oral aperture terminal, very expansile; no differentiated neck-like prolongation; ventral surface flattened, entirely ciliated.

In the *Annals and Magazine of Natural History* for August, 1837, the writer described an Infusorian under the name of *Litonotus vermicularis*, relegating it to that generic group with much doubt and hesitation. In the *Journal of the Trenton Natural History Society* for January, 1838, the diagnosis is republished without comments, and without any expression of that doubt as to its proper position which was still felt by the writer. Recently another Infusorian closely related to the one here referred to, but differing from it specifically, has confirmed the opinion that the former

must, with the latter, be denied admission into the genus *Litonotus*, and perhaps into the family Litonotidæ. The forms differ from the typical *Litonotus* in the absence of the neck-like prolongation, in the absence of the rounded and often conspicuously elevated dorsum, and especially in the position of the oral aperture, which in *Litonotus* is ventrally situated near the base of the neck, while in *Homalozoon* it is exactly apical and terminal. The Infusorian therefore formerly described by the writer under the name of *Litonotus vermicularis* is here transferred to the generic group now proposed for the reception of the two allied forms.

Homalozoon vermiculare, Stokes.—*Litonotus vermicularis*, Stokes, *Ann. and Mag. Nat. Hist.*, Aug., 1887; *Journ. Trenton Nat. Hist. Soc.*, Jan., 1888.

Homalozoon flexile, sp. nov.—Body elongate, from twelve to fifteen times as long as broad, widest centrally, tapering to the obtusely pointed posterior extremity, and to a slight anterior constriction beneath the thickened and obliquely rounded frontal border; cilia short and fine, arranged in longitudinal lines on the flattened ventral surface; dorsal aspect bearing numerous, minute, hispid setæ; trichocysts within the frontal extremity abundant and conspicuous, a few scattered throughout the anterior region; contractile vesicles from twelve to fifteen, arranged in a series near one lateral border; nucleus long, narrow, band-like, variously curved; endoplasm usually granular. Length of body $\frac{1}{15}$ to $\frac{1}{10}$ inch. Hab.—Pond water, with aquatic plants.

This resembles *Homalozoon vermiculare* in contour, but differs in size, in the number of contractile vesicles, and especially in the form of the nucleus and the absence of a keel-like ridge traversing the dorsal aspect.

EXPLANATION OF THE PLATE.

Fig. 1 to 5. Various forms assumed by Mastigamœba reptans.

- “ 6. *Heteromita fusiformis*.
- “ 7. “ “ with amœboid protrusions.
- “ 8. *Heteromita triangularis*.
- “ 9 and 10. Two forms of *Macromastix lapsa*.
- “ 11. *Trachelomonas cervicula*. An empty lorica.
- “ 12. *Trachelomonas similis*.
- “ 13. *Trachelomonas obovata*.
- “ 14. *Trachelomonas spinosa*.
- “ 15. *Epipyxis eurystoma*. An empty lorica.
- “ 16. *Epipyxis socialis*. An empty lorica.
- “ 17. *Cryptoglena alata*.
- “ 18. *Furcilla lobosa*.
- “ 19. “ “ lateral view.
- “ 20. “ “ a variety.
- “ 21. “ “ transverse optic section; diagram.
- “ 22. *Lagenophrys bipartita*.
- “ 23. *Podophrya pusilla*.
- “ 24. *Solenophrya oblonga*.
- “ 25. *Solenophrya alata*.

